The GPGPU Architectural, Programming, and Performance Models

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Synopsis

- Kishore Kothapalli, IIIT Hyderabad
  - High-performance Computing, Graph Theory
- P. J. Narayanan, IIIT Hyderabad
  - High-performance Computing, Computer Vision
- Suryakant Patidar, Nvidia, Bangalore
  - High performance Computing

Synopsis

- GPUs as the main-stream computing platform.
  - Can deliver up to 1 Teraflop at low $$.
  - Have matured from OpenGL extensions to vendor specific C-like extensions such as CUDA.
- GPGPU
  - Use GPUs for also general purpose computing
  - Lots of success stories in computer vision, sorting, and several other domains
  - But, applications need to re-interpreted in massively multi-threaded form to work on GPUs.

Synopsis

- What is the architectural model of a GPU?
- What is the programming abstraction?
- Example Programs
- Regular vs. Irregular Applications
- Performance Modelling.

Assumptions

- Basic knowledge of computer architecture.
- Basic knowledge of sequential algorithms.
- Basic knowledge of programming.

Schedule

0:00 -- 0:10 : Introduction to the Tutorial, Theme, Speakers.

0:10 -- 0:30 : Basic Concepts -- CPU Architectures, GPUs -- evolution, comparison to earlier models of parallel computing

0:30 -- 0:55 : GPU Architectures in Detail -- NVidia architecture, Intel Larrabee architectural features

0:55 -- 1:30 : GPU Programming models with short examples, CUDA

B R E A K

1:50 -- 2:15 : Case studies of regular applications on the GPU

2:15 -- 2:45 : Case studies of irregular applications on the GPU

2:45 -- 3:20 : GPU Analytical Models

Design Space Optimization, Performance Prediction

3:20 -- 3:30 : Concluding remarks, discussion